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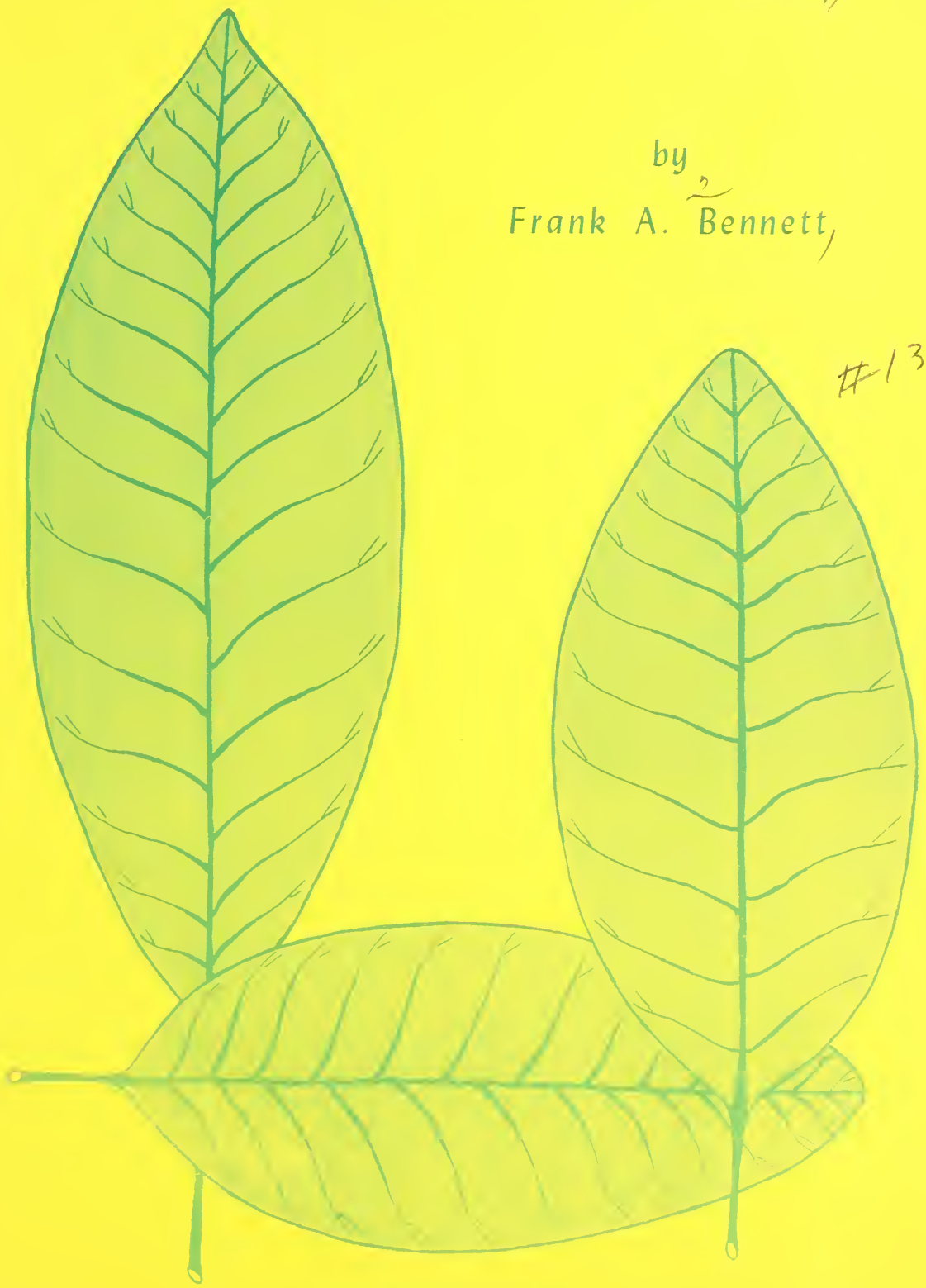

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Silvical Characteristics of Southern Magnolia

(Magnolia grandiflora L.)

by

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Southern magnolia is the largest species of its genus (2). Its range extends from southeastern North Carolina along the Atlantic coast to the Peace River in De Soto County, Florida, and westward along the Gulf coast to the valley of the Brazos River in southeastern Texas (9, 15, 19). It reaches inland for about 100 miles, except in the Mississippi delta, where it grows throughout the State of Louisiana and into southern Arkansas and central Mississippi (fig. 1). In the South it is widely planted as an ornamental. Plantings have also been made as far north as St. Louis, Missouri; Collinsville, Illinois; Washington, D. C.; New Jersey; and Massachusetts. It is reported as being precariously hardy in these regions (4, 12). Plantings along the Pacific coast as far north as British Columbia have been reported (2).

Within its range southern magnolia is commonly referred to as bull bay, evergreen magnolia, or flowering magnolia.

HABITAT CONDITIONS

CLIMATIC

The climate in which southern magnolia grows can be described as warm-temperate to semitropical. Temperatures in general are mild and the growing season long. In a major portion of the range the frost-free season is more than 240 days (14). In the more temperate areas of its range the growing season is from 210 to 239 days. Along the coast, average January temperatures range from 51° to 54° F. in South Carolina and Georgia, and up to 56° in Louisiana (6, v. 10, 14, 20). Mean January temperatures in Florida range from 60° to 70°. July averages for the coastal areas range from 79° to 83°. Inland temperatures within the range of the species may vary from 3° to 5° from these averages. Temperatures below 15° or above 100° are rare within the range of southern magnolia.

Annual rainfall averages 40 to 50 inches in the northeastern portion of its range and 50 to 60 inches in other areas. A small area along the Gulf coast receives 60 to 80 inches yearly. Normally, rainfall is well distributed throughout the year within the range of southern magnolia.

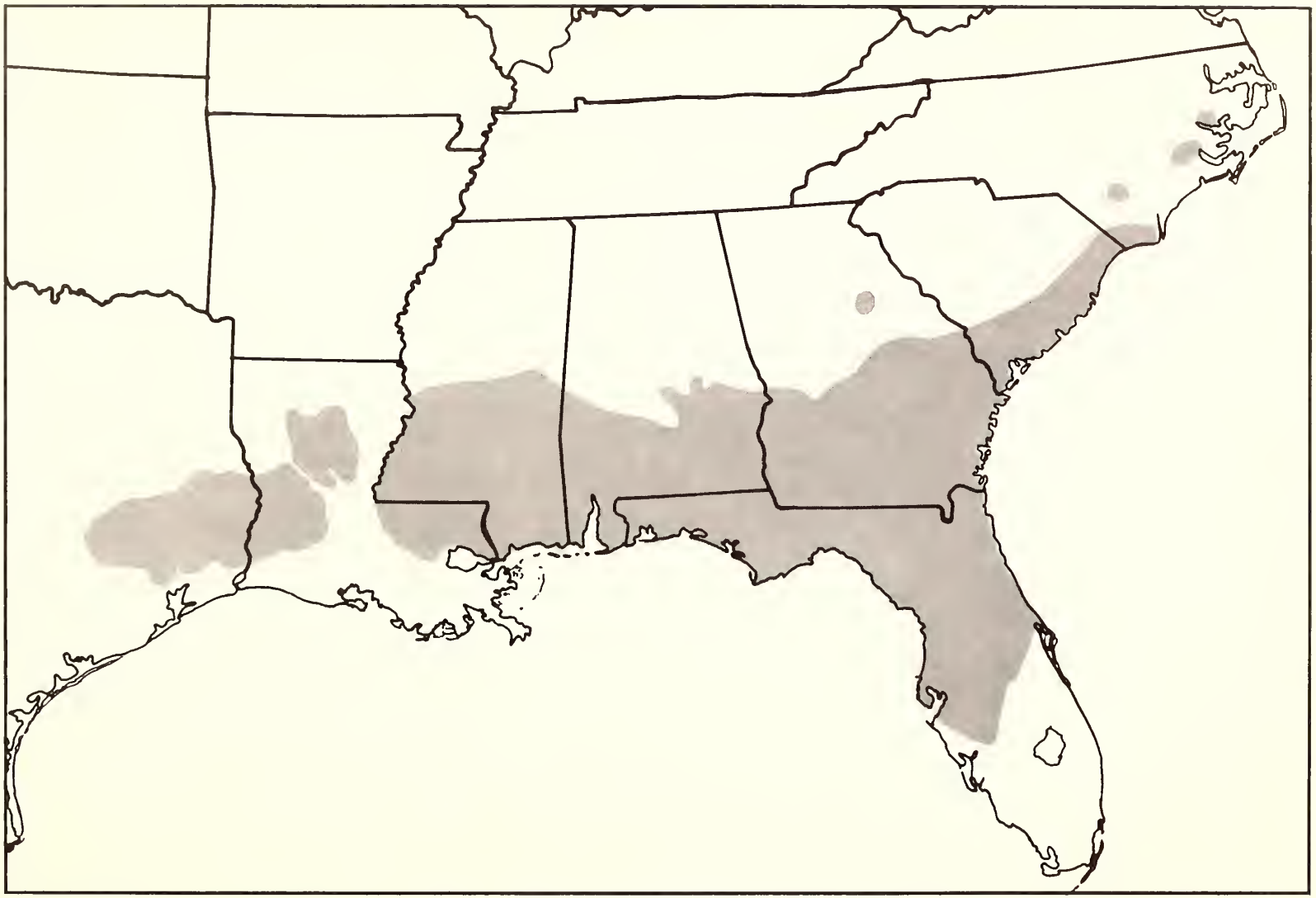

Figure 1.--Botanical range of southern magnolia.

EDAPHIC

Southern magnolia makes its best growth in damp, well-drained soils that are rich in humus and situated along streams or near swamps in the coastal plain area, and in low, moist sites in the upland areas (2, 3). However, numerous ornamental plantings throughout the South indicate the species will grow and thrive on a variety of soils. Although by nature a bottomland species, it cannot withstand prolonged inundation and does not occur on bottoms subject to constant or regular overflow. It does not occur on the lower bottoms of the Mississippi that were regularly overflowed before the levees were built, and it occurs only occasionally on the higher bottoms (1, 2).

Along the coast, the sites on which southern magnolia occurs belong to the Wiesenboden, ground water podzol, and half bog soils of the intrazonal group (18). The primary soils in this area are the Leon-Bladen, Coxville-Portsmouth-Bladen, and Lake Charles-Crowley associations. Farther away from the coast, as in central Florida, Georgia, and in the states to the west, the soils in the natural range of the species belong to the red and yellow podzolic soils of the zonal group. The Norfolk-Ruston association covers the major portion of this area. The Norfolk-Blanton, Greenville-Magnolia, Memphis-Grenada, and Caddo-Beauregard associations are also represented.

PHYSIOGRAPHIC

No portion of the natural range of southern magnolia is over 500 feet in elevation (14). In fact, a great part of the area is less than 200 feet above sea level. The average elevation for the entire State of Louisiana is only 100 feet, and that of Florida is little greater (6, v. 9, 14). The coastal areas of other states within the range of the species are all at 100 feet or less. The northern extreme of its range in Georgia, Mississippi, and Arkansas approaches altitudes of 300 to 400 feet.

The latitudinal range of southern magnolia is from approximately 27°N. to about 35° N.

BIOTIC

Southern magnolia does not grow in pure stands (1, 2). Usually it is associated with blackgum (Nyssa sylvatica), sweetgum (Liquidambar styraciflua), red maple (Acer rubrum), yellow-poplar (Liriodendron tulipifera), the lowland oaks, and other lowland species. It is listed as a chief associate in only the live oak forest type--a climax type--by the Society of American Foresters (16). Putnam (13) lists the species as a component of his white oaks-red oaks-other hardwoods type which combines the hickory-swamp chestnut oak-white oak, redgum-swamp red oak, and oak-elm-ash types as set forth by the Society of American Foresters.

This combination also embraces limited areas of pine-hardwood types, which include loblolly pine (Pinus taeda) and spruce pine (Pinus glabra). Eggler (7) suggests that southern magnolia, along with live oak (Quercus virginiana) and water oak (Quercus nigra), is generally a member of the climax forest in southern Louisiana.

LIFE HISTORY

SEEDING HABITS

Flowering and fruiting.--The large, fragrant flowers of southern magnolia are formed from April to June within its natural range (fig. 2). Plantings farther north may flower as late as August (4, 15). The flowers are creamy white, 6 to 8 inches across, have from 6 to 12 petals, and are very delicate. The petals all have a spot of color at the base, which gives the flower a purple center. Each flower lasts from two to several days, according to the weather.

At the falling of the petals, the oval fruit appears. In the juvenile stage, it is pink and covered with thick, lustrous hair. At maturity, both fruit and hair are a rusty brown. Measuring 3 to 4 inches in length and $1\frac{1}{2}$ to 2 inches in thickness, the follicle-type fruit matures from September to late fall. The seed are red, oily, kidney-shaped, about one-half inch long, have a pleasant cinnamon-like odor, and when the cone opens, hang for a while by slender, silken threads before dropping to the ground.

Seed production.--Southern magnolia is generally a prolific seed producer, being essentially the most floriferous forest tree. According to Kyle (11), each new shoot on every limb bears a flower, and in turn a fruit with numerous seed. Pring (12) reported one specimen produced abundant seed about 10 years after being planted in the St. Louis area. It was 5 feet high when planted. He mentions other planted specimens that produced numerous seed at early ages when they were 8 to 9 inches in diameter.

Seed dissemination.--Ordinarily the fruit is ripe by September--at least in the southern areas--the follicles open, and the seed begin to fall. Natural dissemination is accomplished mostly by birds and animals, the seed being too heavy to be distributed by air currents. Examinations show the seed are a part of the diet of squirrels (Sciurus sp.), opossums (Didelphis virginiana virginiana), quail (Colinus virginianus), turkey (Meleagris gallopavo), and other rodents and birds. The washing action of heavy rains and flash floods may cause some movement of seed.

Figure 2.--Typical bark, fruit and leaves, twig and bud of southern magnolia.

SEEDLING DEVELOPMENT

Establishment.--Evans (8) reports that the seed of southern magnolia, although viable, rarely germinate when shed from the tree. Kurz and Wagner (10) later supported this with the report that the species does not reproduce within the area dominated by the canopy and root system of the parent tree. Evans demonstrated further that neither the seed nor the seedling can withstand a light freeze for 48 hours. This accounts for the limited natural range of the tree.

The dormancy of southern magnolia seed is thought to be associated, in part at least, with the lignified seed coat. It is believed that the hard endosperm requires an unusual length of time for the absorption of sufficient water for germination. Tests have further shown that seeds set to germinate with the fleshy outer coat retained are destroyed by fungi (8).

Nurserymen report that if the seed are allowed to dry out they will lie over for a year before sprouting, if they sprout at all. They advise macerating the seed and stratifying them in moist sand until planting time in the spring.

According to Pring (12), young plants in the nursery average 18 to 24 inches in height growth yearly.

Early growth.--Little is known about the early growth and development of southern magnolia, especially in its natural state. A few reports are available on specimens planted in the St. Louis area. Twelve trees grown from seed collected locally were planted in the Missouri Botanical Garden in 1940. All grew well and in 1946 were 5 feet or more in height. At this time two were transplanted, and one of them more than doubled its height in the succeeding 4 years. Another specimen, about 5 feet in height, was obtained from a Georgia nursery in 1934. In 1950 it was reported as being 20 feet in height and about 10 inches in diameter. Similar growth for other plantings in the same area is reported. Under favorable conditions in its natural state it is classed as making fairly rapid growth (1, 2).

SAPLING STAGE TO MATURITY

Growth and yield.--Southern magnolia will endure a considerable amount of shading in its early life but requires more sunlight as it grows older. Under favorable conditions, forest-grown trees generally reach a height of 60 to 80 feet at an age of 80 to 120 years, and are not uncommonly 2 to 3 feet in diameter (1, 2, 9). Occasional trees exceed 100 feet in height and approach 5 feet in diameter. In 1917, Kyle (11) reported heights of 100 to 125 feet in Florida, with the largest known tree measuring 18 feet in circumference at the base. Sawtimber-size trees are frequently clear of limbs for 40 feet above ground (fig. 3).

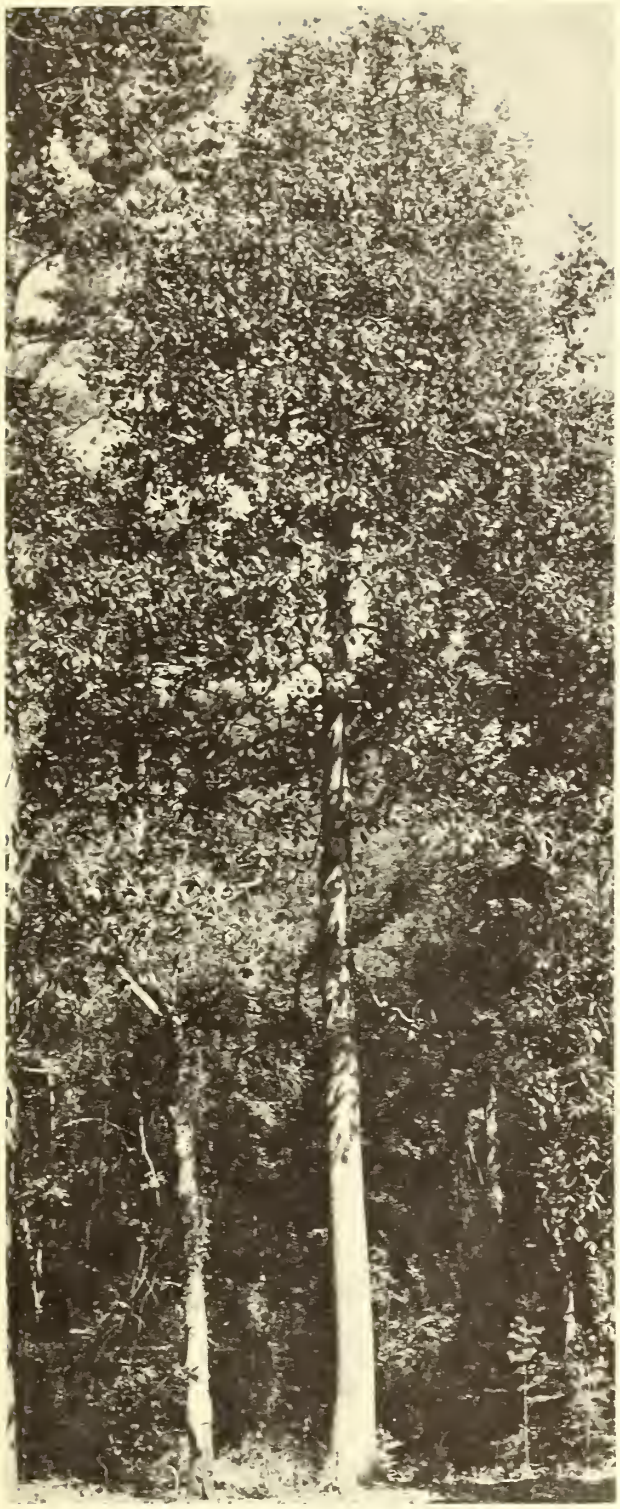

Figure 3.--Forest-grown southern magnolia from middle coastal plain of Georgia, near Cordele. Note the clear bole of high-quality saw logs.

Since southern magnolia does not occur in pure stands, estimates of yields are not available. The most recent forest survey, which covered the entire range of the species, did not find southern magnolia in sufficient quantity in any state to warrant listing it as a separate species. Estimates, however, place the existing stand at not less than 1 billion board feet.

Southern magnolia is relatively free of insect pests (17, pp. 61, 78). Although no serious attacks have been reported in forest stands, several scale insects such as the magnolia scale (Neolecanium cornuparvum), oleander scale (Asterolecanium pustulans), and tulip tree scale (Toumeyella liriodendri) may attack the tree and can cause injury (5).

Although a number of fungi, including species of Cladosporium, Collectotrichum, Glomerella, Phyllosticta, and Septoria cause leaf spots on southern magnolia, none appear to be damaging to forest stands. Fomes geotropus causes a heart rot of the species.

SPECIAL FEATURES

The seed of southern magnolia were once used in making a rare perfume which possessed the same delicate scent as the flower (11).

A study of fossils indicates that the magnolias are among the most ancient trees of the world (2). The size and simple construction of the flower further indicate this. The present magnolias are thought to be a remnant of a very extensive group of north temperate forest trees which grew in Europe, Siberia, North America, and Greenland before the Glacial Period. Their history is believed to be about as ancient as that of the ginkgo, and the ranges of the two are thought to have been similar in early times.

The foliage is commonly used for decorative purposes, especially at Christmastime. Because of its stability under a wide variety of temperature and humidity conditions, the wood of southern magnolia has been widely used in the past for the manufacture of venetian blinds, and at present it is being used in the furniture industry.

RACES AND HYBRIDS

To date evidence of the existence of racial strains or hybrids in southern magnolia has not been established.

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